

will likewise address the merits of the Official Action as applied to these new claims.

At the outset, the Examiner had objected to Claim 3 because the conjunction "or" was missing in front of the "OH" in line 11. Applicants note that by the present amendment, such connector has in fact been added.

Applicants and the Examiner next discussed the rejection of the Claims 1-16 under 35 U.S.C. §103 as being unpatentable over Dams in view of Milbert or Milbert in view of Dams. For the sake of completeness, applicants will likewise address that rejection to the extent applicable to Claims 17-30.

In a first aspect, the present invention relates to a composition comprising:

- a) from about 15% to about 50%, by weight of the total composition, of a silicone polymer;
- b) from about 5% to about 30% by weight of the total composition of a reinforcing filler;
- c) from about 20% to about 70% by weight of the total composition of an anti-tracking agent and a flame retardant;
- d) from about 0.01% to about 1% by weight of the total composition of a coupling agent;
- e) from about 0.1% to about 5% by weight of the total composition of a curing agent;
- f) up to about 20% by weight of the total composition of an extending filler; and
- g) from about 0.1% to about 5% by weight of the total composition of at least one processing fluid.

The coupling agent is present in an amount effective to act as a surface modifier for the reinforcing filler and the anti-tracking agent. Preferably, it is also present in an amount effective to act as a cross-linker for coupling between the reinforcing filler and the anti-tracking agent with the polymer.

In a second aspect, the present invention relates to a silicone rubber composition comprising:

(A) 100 weight parts organopolysiloxane gum having at least 2 silicon- bonded alkenyl groups in each molecule and the average compositional formula:

RaSiO(4-a)/2

in which R is selected from substituted and unsubstituted monovalent hydrocarbon groups and a has a value from 1.95 to 2.05,

- (B) 5 to 300 weight parts aluminum hydroxide powder,
- (C) 0.1 to 1 weight part of a silane treating agent, and
- (D) 0.1 to 5 weight parts of a peroxide based curing agent.

In a preferred embodiment, the silane treating agent (C) is an organosiloxane coupling agent which is present in an amount effective to act as a cross-linker for coupling between the aluminum hydroxide powder with the gum and as a surface modifier for the aluminum hydroxide powder.

As disclosed in detail in the originally filed application, the present invention provides a heat-cured rubber silicone composition suitable for out-door high voltage insulator applications. The silicone rubber composition is fitted over a structural component, such as a glass-fiber reinforced resin rod, to provide insulation. The aluminum hydroxide powder, also known as aluminum trihydrate (ATH) improves the arc resistance and the flame retardancy of the composition.

The silane treating agent (or coupling agent) acts as a surface modifier for the ATH and as a cross linker for the coupling between the ATH and the siloxane polymers. The coupling agent renders the ATH hydrophobic and causes it to interact with the polysiloxane thereby enhancing its dispersibility and reinforcing effect.

Dams discloses pigmented organopolysiloxane elastomer-forming compositions which in the cured state have improved color stability and used in a variety of applications where good electrical properties and resistance to high temperatures are required, for example as high and low voltage insulation. Dams observed that, when employed under conditions involving exposure to a corona discharge, pigmented elastomers quickly lose their color. Dams therefore purported to solve such problem by providing a composition which comprises,

- (A) a polydiorganosiloxane convertible to the solid elastic state,
- (B) a filler,
- (C) an organic peroxide curing agent, and

(D) from 0.01 to 10 parts by weight per 100 parts by weight of (A) of a pigment which is an inorganic calcined complex containing Co and Al.

The polydiorganosiloxane (A) may comprise a polydimethylsiloxane free of vinyl groups, or with the vinyl groups attached to terminal silicon atoms, together with a polydimethylsiloxane having a proportion of vinyl groups attached to non-terminal silicon atoms.

Any suitable filler may be employed as component (B) including for example reinforcing and non-reinforcing silicas such as fume silica. They may be untreated, or they may be treated to modify their surface properties. Methods for modifying the surfaces of fillers employed in organopolysiloxane elastomers include the pretreatment or in situ treatment of the filler with a variety of organosilicon products, for example methyl chlorosilanes, vinyl alkoxy silanes. It is normally preferred that the treatment of the filler be carried out in situ, that is by incorporating the treating agent per se into the curable composition.

As the curing agent (C) for the composition there may be employed any free radical generating organic peroxide compound.

Component (D) is a pigment which is an inorganic calcined complex containing Co and Al.

In addition to components (A) to (D), the compositions of Dams may contain other ingredients including processing aids and additives for improving the electrical properties of the elastomer. When the compositions are destined for use as high voltage insulating materials a preferred additive is alumina trihydrate employed in a proportion of from about 40 to about 160 parts by weight per 100 parts by weight of the polydiorganosiloxane (A).

The Examiner has cited Dams col. 2, lines 16-17 and lines 43-44, for disclosing a processing fluid and a mold release agent. The applicants respectfully note that col. 2, lines 13-20, disclose that the polydiorganosiloxane polymeric specie may consist of two more species and that one of these may be a polydimethylsiloxane free of vinyl groups. This does not teach a processing fluid capped with hydroxyl, alkyl and phenyl groups at both terminal ends of the claim. Neither does it teach a silicon fluid, magnesium, aluminum or cerium stearate which are disclosed in the present application as mold release agents.

d. 1
does not require such

The compositions of Dams are said to be particularly suitable for use in the fabrication of articles which may be subjected to the effect of electrical surface

limitation
not in the claim

discharges and where resistance to change in the electrical and physical properties is desired. One example of such an application is in the construction of high voltage insulators of the kind comprising silicone rubber sheds mounted on a central rod, usually of resin-bonded fiberglass.

The inventions as defined by Claims 1 and 17 differ from Dams in that:

(1) Dams does not disclose use of a coupling agent "present in an amount effective to act as a surface modifier for the reinforcing filler and the anti-tracking agent" and preferably also as a cross-linker for coupling between said reinforcing filler and said anti-tracking agent with the polymer" (Claim 1) or "in an amount effective to act as a surface modifier for the aluminum hydroxide powder" (Claim 17) and preferably also as a cross-linker for coupling between said aluminum hydroxide powder with siloxane gum" (Claim 32). Rather, to the extent that Dams discloses a use of such an agent at all, it is in the context of "modifying the surfaces of fillers employed in organopolysiloxane elastomers" (column 2, lines 38-39). Dams therefore proposes as alternatives either pretreatment or *in situ* treatment of filler. This alternative could not be implemented in the practice of the present invention because pretreatment of the filler before admixing it with the siloxane would result in no treatment of the ATH with the coupling agent (even in instances where one employed ATH according to the teaching of Dams); and

(2) Dams does not disclose a processing fluid (Claim 1). *← check spec. for definition*

(3) Dams does not disclose a mold release agent (Claim 12).

The other reference applied against the claims was Milbert which discloses organopolysiloxane compositions which cure at elevated temperatures to give elastomers which are said to be flame resistant, for application to vehicles. The composition comprises (a) 100 parts of at least one diorganopolysiloxane rubber, of 2 to 80 million cps; (b) 5 to 100 parts of at least one inorganic filler; (c) 0.2 to 5 parts of an organic peroxide; (d) 0.001 to 0.01 part of a platinum additive; and (e) at least one rare earth metal oxide or hydroxide. The filler (b) can be modified by treatment with organosilicon compounds such as silazane, trimethylchlorosilane and dimethylvinylchlorosilane. For the purpose of preventing the compositions from curing during storage, organosilicon plasticisers can also be added, such as alkoxylated diorganopolysiloxane oils of low molecular weight.

In the examples, the filler is pretreated with the coupling agent before admixture with the remaining components of the composition.

The elastomers so obtained are said to have good mechanical properties and be fire resistant and for use in sheathing of electrical conductors.

The inventions as defined by Claims 1 and 17 differ from Milbert in that

- (1) Milbert does not disclose inclusion of an anti-tracking agent (Claim 1) or the inclusion of ATH as the anti-tracking agent (Claim 17);
- (2) Milbert does not disclose use of a coupling agent "present in an amount effective to act as a surface modifier for the reinforcing filler and the anti-tracking agent" and preferably also as a cross-linker for coupling between said reinforcing filler and said anti-tracking agent with the polymer" (Claim 31) or "in an amount effective to act as a surface modifier for the aluminum hydroxide powder" (Claim 17) and preferably also as a cross-linker for coupling between said aluminum hydroxide powder with siloxane gum" (Claim 32). Rather, the coupling agent is used only in the context of treating a filler prior to introduction of the filler into the composition. Accordingly, a composition as claimed could not possibly result following the teachings of Milbert.

Milbert teaches away from the present invention in at least two ways. (1) Milbert teaches that the described physical properties are obtained by adding platinum and rare earth metal oxides or hydroxides. Milbert teaches in col. 1, lines 27, that it is impossible "to prepare elastomers with good mechanical properties in the presence of titanium dioxide" and in col. 3, lines 12-16 that magnesium oxide may be used with rare earth metal oxides but that the ratio of the rare earth metal hydroxide/magnesium oxide is preferably greater than 0.7/1 because a lower ratio does not always make it possible to get reproducible results. Alumina trihydrate $\text{Al}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$ is an oxide of aluminum. Aluminum with atomic number 13 is between magnesium atomic number 12 and titanium atomic number 22 on the periodic chart, hence, if oxides of magnesium and titanium are fraught with problems in the compositions of Milbert, it is not reasonable for one skilled in the art to expect ATH to be compatible with the composition of Milbert.

(2) Milbert teaches the use of platinum catalyst (col. 1, lines 48-49). It is well-known in the art that compositions with organoperoxide curing agents are distinguishable from addition reaction curing compositions utilizing platinum catalysts for the curing process.

The above discussion should make clear that regardless of whether the teachings of Milbert are incorporated into the teachings of Dams or vice versa, the claimed invention does not result. More particularly, neither reference *prima facie* suggests inclusion of the coupling agent in an amount effective to act as a surface modifier for the reinforcing filler and the anti-tracking agent and preferably also as a cross-linker for coupling between said reinforcing filler and said anti-tracking agent with the polymer" (Claim 1) or "in an amount effective to act as a surface modifier for the aluminum hydroxide powder and preferably as a cross-linker for coupling between said aluminum hydroxide powder with siloxane gum (Claim 17).

In Milbert, in every instance, the coupling agent is pre-mixed with the filler before its introduction into the mixture. Under such conditions, the coupling agent will not bond to the anti-tracking agent. In Dams, there are two alternatives presented, one involving *in situ* admixing and the other involving premixing of the coupling agent and the reinforcing filler. As was the case with Milbert, the coupling agent of Dams likewise will not bond to the anti-tracking agent in the alternative where the reinforcing filler is pre-treated with the coupling agent.

*Even if one of ordinary skill in the art were to admix the coupling agent with the filler component *in situ* according to the other alternative of Dams, a composition as claimed will not result. The claims require an amount of coupling agent **effective** to act as a surface modifier for the reinforcing filler and the anti-tracking agent and preferably also as a cross-linker for coupling between said reinforcing filler and said anti-tracking agent with the polymer. However, the only purpose of the coupling agent according to Dams is to modify the surface properties of the filler. Common sense dictates that the amount of coupling agent which would be effective if one were seeking to modify only the surface properties of a filler is different than the amount effective for modifying the surface properties of both a filler component and an anti-tracking component.* In view of the complete failure of either Dams or Milbert to suggest surface treatment of the tracking agent, however, one of ordinary skill in the art at the time of the invention would have had no motivation to have made such an investigation or to have increased the amount of coupling agent.

To dispel any doubt whatsoever concerning the nonobviousness of the invention, reference is now made to Table II of page 14 of the application which is repeated as follows:

VTES parts	ATH parts	Shore A hardness	Tensile Strength psi	Dielectric Strength vpm	Track/Erosion Resistance (min)
1	100	75	989	477	380
0.5	100	73	915	457	334
1	100	72	975	430	360
0.5	100	71	870	477	292
1	85	74	1050	462	343
0.5	85	72	969	484	182
1	85	71	1028	476	287
0.5	85	69	903	477	127

showing of criticality does not compare with scope of the claim

The above Table demonstrates the importance of providing sufficient coupling agent (in this case VTES) for the amount of ATH employed. In very instance where there was 1 part VTES rather than 0.5 part VTES, there was a significantly longer track/Erosion resistance obtained. It must also be recognized that the filler used in this example was a fumed silica which was pretreated with dimethyl tetra-cyclopolsiloxane (See page 12). In other words, none of the VTES was needed for surface treatment of the reinforcing filler. Applicants can think of no better evidence of the nonobviousness of the coupling agent/ATH combination than the fact that even when a coupling agent/reinforcing agent is used in the admixture (as is done in the prior art), better results are obtained with the additional coupling agent for the ATH.

Does this reflect in the claims?

In sum, therefore, the art of record simply does not recognize what the present applicants have recognized namely, the desirability of modifying the surface of an anti-tracking agent such as ATH with a coupling agent to obtain improved electrical properties. Indeed, even when following the prior art and using a coupling agent with a reinforcing filler, significant improvements in electrical properties are observed with the inclusion of coupling agent for the modification of the surface of the anti-tracking component.

Claims 17-20 were also rejected under 35 U.S.C. §102(a) as being anticipated by Matsushita et al., EP 0,787,772. That rejection is believed to have been rendered moot by virtue of the filing at the present time of a Declaration Pursuant to 37 C.F. R. § 1.131.

More specifically, the effective filing date of the present application is December 30, 1997. The publication date of the European patent is August 6, 1997, which is obviously less than one year prior to the filing date of the present application. Accordingly, the European application may be overcome by presenting evidence in a Declaration Pursuant to 37 C.F.R. § 1.131 demonstrating that the invention was made before the publication date of the reference. The attached Declaration includes an exhibit which indeed shows all of the elements of the claims prior to the critical date.

Withdrawal of the rejection under 35 U.S.C. §102(a) as being unpatentable over the European patent is therefore respectfully requested.

In the event that there are any questions relating to this Amendment or to the application in general, it would be appreciated if the Examiner would contact the undersigned attorney concerning such questions so that prosecution of this application may be expedited.

Respectfully submitted,

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Date: August 7, 2001

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